

## **SUPPLEMENTAL CHAPTER 3. PROJECTED NATIONAL IMPACTS OF STANDARD LEVELS: KITCHEN RANGES AND OVENS**

The LBNL Residential Energy Model (LBNL-REM) projects a number of economic and energy-use variables that are used to assess the impact of proposed standard levels on consumers, electric utilities, and appliance manufacturers. This chapter presents projections from the model, which assume various standard levels.

The principal outputs from the LBNL-REM for each year are:

- unit equipment price and operating expense by product,
- projected annual shipments of residential appliances,
- energy consumption by end use and fuel, and
- differences in these quantities between a base case and each energy efficiency level.

These outputs are calculated for each year and accumulated over the time period from 2001 to 2030. Energy savings are given for each year from implementation of standard levels to the end of the period. Net present value of the standard levels is evaluated for each regulated product and for the end use(s) comprising the regulated and competing products. The analysis is done for three separate scenarios, based on different sets of fuel price projections and housing forecasts. The three scenarios are (1) fuel price and housing forecasts based on the AEO 1995<sup>1</sup>, (2) fuel price and housing forecasts based on the AEO 1997<sup>2</sup> and (3) fuel price forecasts from the GRI 1997<sup>3</sup> and housing forecasts from AEO 1997. Supplemental Table 3.1 shows a comparison of the three fuel price projections.

**Supplemental Table 3.1 Fuel Price Projections**

	Electricity (cent/kWh, 1990 dollar)			Gas (\$/MMBtu, 1990 dollar)		
	AEO 1995	AEO 1997	GRI 1997	AEO 1995	AEO 1997	GRI 1997
1995	7.47	7.22	7.22	5.40	5.05	5.05
2000	7.39	7.05	6.70	5.32	4.83	5.15
2010	7.92	6.70	5.78	6.26	4.52	4.57
2020	8.17	6.35	5.34	6.78	4.37	4.30
2030	8.41	6.02	4.93	7.34	4.22	4.06

<sup>1</sup> U.S. DOE, Energy Information Administration. 1995. *Annual Energy Outlook with Projections to 2010*. Washington, DC. DOE/EIA-0383(95). January

<sup>2</sup> U.S. DOE, Energy Information Administration. 1997. *Annual Energy Outlook with Projections to 2015*. Washington, DC. DOE/EIA-0383(97). January

<sup>3</sup> Gas Research Institute (GRI). 1997. *Baseline Projection Data Book*. Prepared by Baseline/Gas Resource Analytical Center, Washington, DC for the Gas Research Institute, Chicago, IL.

Section 3.1 presents the standard levels analyzed. Section 3.2 presents the historical and projected energy consumption, including unit energy consumption for new purchases, and total national energy consumption. Section 3.3 presents summaries of cumulative installations from 2001 to 2030. Section 3.4 presents purchase prices and Section 3.5 presents net present values. Section 3.6 discusses the results of the sensitivity analysis.

### **3.1 STANDARD LEVELS**

Supplemental Table 3.2 shows the correspondence between the standard levels and the engineering design levels.

**Supplemental Table 3.2 Standard Levels for Cooktops and Ovens**

Product Class:	Standard Level			
	1	2	3	3A
Engineering Design Option				
Electric Cooktop, Coil Element	0	0	0	0
Electric Cooktop, Smooth Element	0	0	0	0
Gas Cooktop	0	0	1	1
Electric Oven, Non-Self-Cleaning	1	2	2	0
Electric Oven, Self-Cleaning	0	0	0	0
Gas Oven, Non-Self-Cleaning	0	0	1	1
Gas Oven, Self Cleaning	0	0	0	0

### **3.2 ENERGY CONSUMPTION**

In order to project the effect on energy savings if pilot lights were not allowed on gas ranges and ovens, it is necessary to determine how many ranges, cooktops and ovens are built with pilot lights now and how many will be built with pilot lights in the future when no new standards are enacted. Similarly, the future projections of ovens having a self-cleaning feature has to be estimated.

Ranges have both cooktops and ovens. Surface cooktops are those sold separately without an oven. Built-ins refer to ovens that are built into cabinetry and refer only to ovens.

Data on ranges, ovens, and cooktops were obtained from two data sources. The first source is the AHAM Fact Book<sup>4</sup>, excerpt shown in Supplemental Table 3.3, which gives the break down of shipments from 1986 to 1996 of free standing ranges, built-in's and surface cooktops. The second source, as shown in Supplemental Tables 3.4 and 3.5 is data supplied to the Department from

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<sup>4</sup>

Association of Home Appliance Manufacturers, 1996. AHAM Fact Book 1996

AHAM. The data contain information on the percentages of shipment of gas ranges and gas ovens that have standing pilot lights as well as percentages of electric and gas ovens that have the self-cleaning feature.

**Supplemental Table 3.3 Shipments<sup>a</sup> of Gas Ranges and Ovens (Thousands)**

Year	Free Standing Range	Built-In Oven	Surface Cooktop	Total Gas Cooktop <sup>b</sup>	Total Gas Oven <sup>c</sup>
1986	1,826	114	150	1,976	1,940
1987	2,022	120	176	2,198	2,142
1988	2,101	127	230	2,331	2,228
1989	2,055	112	247	3,202	2,167
1990	2,061	106	262	2,323	2,167
1991	2,039	92	268	2,307	2,131
1992	2,221	91	301	2,522	2,312
1993	2,343	90	322	2,665	2,433
1994	2,534	88	337	2,871	2,622
1995	2,490	86	278	2,768	2,576
1996	2,470	84	280	2,750	2,554

Source: AHAM Fact Book, 1996

a: includes imports, domestically produced shipments and export shipments

b: total gas cooktops = free standing ranges + surface cooktops

c: total gas ovens = free standing ranges + built-in ovens

**Supplemental Table 3.4 Percent of Gas Ranges and Ovens with a Pilot**

Year	Free Standing Range	Built-In Oven	Surface Cooktop	Total Gas Cooktop	Total Gas Oven
1988	34.1%	1.6%	16.5%	32.4%	32.2%
1989	32.7%	2.7%	15.4%	30.8%	31.1%
1990	28.5%	4.6%	9.7%	26.4%	27.3%
1991	26.6%	0.0%	8.1%	24.5%	25.5%
1992	27.1%	0.0%	10.4%	25.1%	26.0%
1993	23.5%	0.0%	8.3%	21.7%	22.6%
1994	28.2%	0.0%	12.6%	26.4%	27.3%
1995	25.4%	0.0%	3.3%	23.2%	24.6%
1996	23.3%	0.0%	NA	NA	22.5%

Source: AHAM, July 3, 1997. Mary K. Matimore, Manager, Market Data

**Supplemental Table 3.5 Percent of Electric and Gas Oven with Self-Cleaning**

Year	Electric Oven	Gas Range Oven	Gas Built-in Oven
1988	57.5%	29.1%	4.4%
1989	53.2%	25.8%	12.8%
1990	57.4%	25.4%	17.6%
1991	57.2%	27.2%	18.4%
1992	56.2%	27.9%	16.4%
1993	56.9%	31.4%	25.5%
1994	60.1%	29.4%	16.4%
1995	60.2%	34.0%	24.9%
1996	63.2%	36.0%	19.7%

Source: AHAM, July 3, 1997. Mary K. Matimore, Manager, Market Data

In order to estimate the average energy use of new cooktops and ovens, weighted-averages are calculated by taking the product of the UEC for each class times class-specific weighting factors, and then summing over the classes. Gas cooktops are separated into two classes, namely range cooktops and surface cooktops. This enables different rates of penetration of electronic ignition to be modeled separately for the two categories. The historical percentages of gas range cooktops versus gas surface cooktops are based on data from AHAM (see Supplemental Table 3.3). From 1997 on, gas range cooktops are then assumed to take up 89% of the market while gas surface cooktops are assumed to take up 11%.

Similarly, gas non-self-cleaning ovens are also broken into range ovens and built-in ovens to allow separate projections of the displacement of standing pilots. However, this distinction is not done for gas self-cleaning ovens because all gas self-cleaning ovens are assumed to be without standing pilots. This results in three classes of gas ovens, namely, 1) non-self-cleaning range ovens, 2) non-self-cleaning built-in ovens and 3) self-cleaning ovens. The historical percentages for the three classes of gas ovens are calculated using data from AHAM as given in Supplemental Tables 3.3, 3.4 and 3.5. Projections of future percentages are estimated using regressions on the historical data. Supplemental Tables 3.6 and 3.7 show the percentages, or weighting factors, for cooktops and ovens.

**Supplemental Table 3.6 Weighting Factors for Cooktops**

	Electric Cooktop		Gas Cooktop	
	Coil Element	Smooth Element	Range	Surface
1995	0.85	0.15	0.90	0.10
2000-2030	0.85	0.15	0.89	0.11

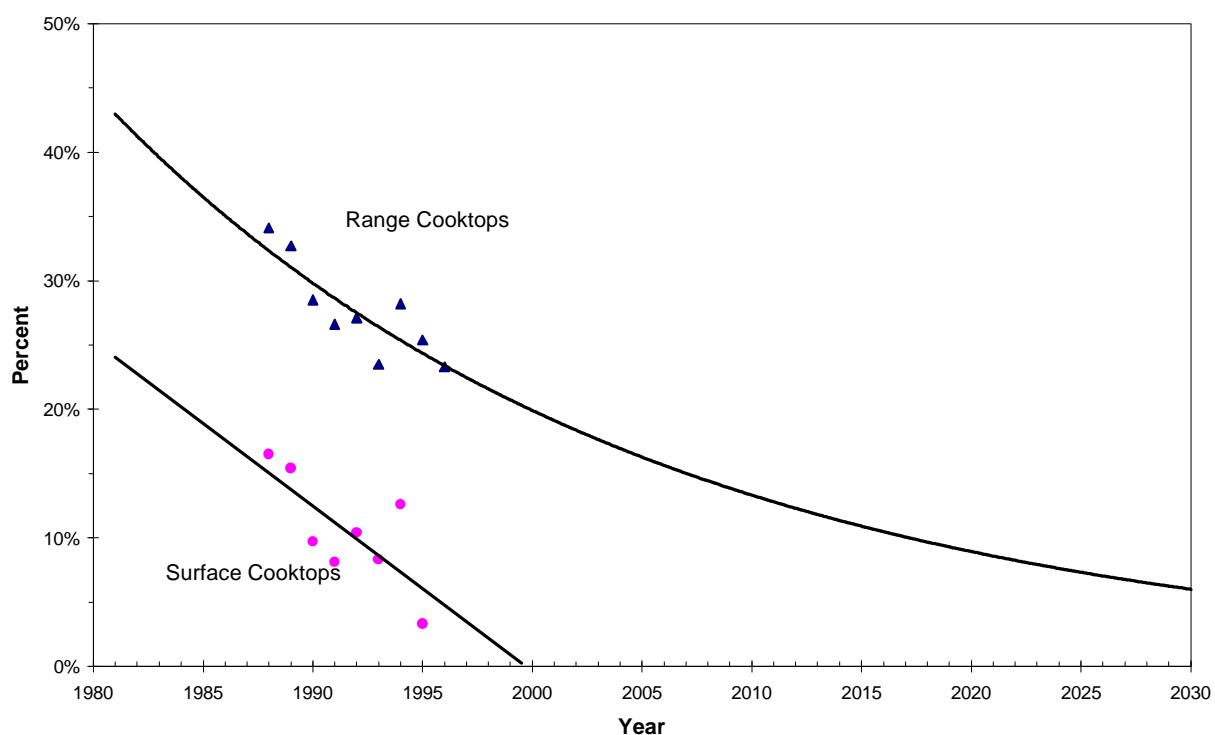
**Supplemental Table 3.7 Weighting Factors for Ovens\***

	Electric Oven		Gas Oven		
	w/o Self Cleaning	Self Cleaning	w/o Self Cleaning	Self Cleaning	
1995	<i>Range &amp; Built-in</i>	0.40	<i>Range &amp; Built-in</i>	0.60	0.64    0.02    0.34
2000	0.35	0.65	0.60	0.02	0.38
2010	0.27	0.73	0.50	0.01	0.50
2020	0.19	0.81	0.39	0.00	0.61
2030	0.11	0.89	0.27	0.00	0.73

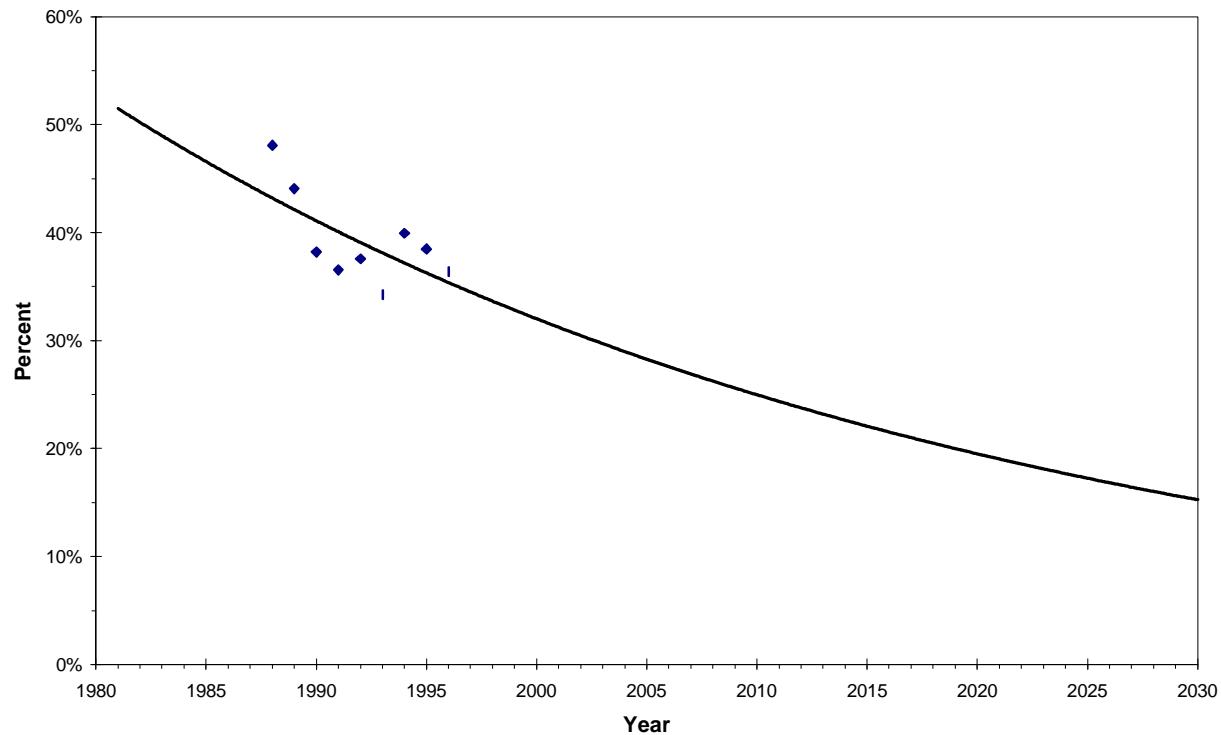
\* Range ovens and built-in ovens are separated only for non self-cleaning gas ovens.

The next step in estimating the UEC of gas cooktops and gas ovens is to obtain a projection of the percentage of future shipments that have standing pilots. Regressions on the historical data from AHAM are used to obtain those estimates. Figure 3.1 shows the projections of percentages of gas range cooktops and gas surface cooktops with pilots. For gas ovens, future shipments of self-cleaning units are assumed to be without pilots. Figure 3.2 shows the projection of percentages of non-self-cleaning gas range ovens with pilots. Gas built-in ovens of the non self-cleaning type have been without pilots since 1991.

**Figure 3.1 Percentages of Gas Cooktops with Standing Pilots**



**Figure 3.2 Percentage of non Self-Cleaning Gas Range Ovens with Standing Pilots**



Supplemental Table 3.8 shows the percentages of shipments with pilots for gas range cooktops and surface cooktops as well as non self-cleaning gas ovens found in ranges and built-in ovens.

**Supplemental Table 3.8 Percentage of Units with Pilots**

	Gas Cooktop		Gas non Self-Cleaning Oven	
	Range	Surface	Range	Built-in
1995	25.4%	3.3%	38.5%	0.0%
2000	19.9%	0.0%	32.0%	0.0%
2010	13.3%	0.0%	25.0%	0.0%
2020	8.9%	0.0%	19.5%	0.0%
2030	6.0%	0.0%	15.3%	0.0%

Supplemental Tables 3.9a to 3.12a show the past and projected average energy use of new cooktops and ovens for the AEO 1995 case. Supplemental Tables 3.9b to 3.12b and Supplemental Tables 3.9c to 3.12c show the same information for the AEO 1997 and GRI 1997 cases respectively. The UEC of electric cooktops is projected to stay constant over the analysis period. The UEC of gas cooktops is projected to decrease due to the displacement of standing pilots by electronic ignition. The UEC of electric ovens increases as more self-cleaning units are expected to enter the market. The UEC of gas ovens decreases because of the move towards electronic ignition for the non self-cleaning ovens and the increased penetration of the self-cleaning units which do not have pilot lights.

The UEC of cooktops and ovens are the same in the base case for the three scenarios except in the case of electric cooktops. For the AEO 1995 case, which has a positive growth in electricity price, the LBNL-REM model forecasts a decrease in UEC for electric cooktops after 2010, while it remains constant in the two other scenarios.

Supplemental Tables 3.13a to 3.18a show the national energy consumption for cooktops and ovens for the AEO 1995 case. Supplemental Tables 3.13b to 3.18b and 3.13c to 3.18c show the same results for the AEO 1997 and GRI 1997 cases respectively. The conversion from kWh to primary energy is 11500 Btu per kWh.

*Unit Energy Consumption, AEO 1995 Case*

**Supplemental Table 3.9a Unit Energy Consumption for New Electric Cooktops  
AEO 1995 Case (Weighted-Average kWh/year)**

Year	Base	Standard Level			
		1	2	3	3A
1981	235				
1993	235				
1996	235				
2001	235	235	235	235	235
2015	226	226	226	226	226
2030	226	226	226	226	226

**Supplemental Table 3.10a Unit Energy Consumption for New Gas Cooktops  
AEO 1995 Case (Weighted-Average Million Btu/Year)**

Year	Base	Standard Level			
		1	2	3	3A
1981	2.17				
1993	1.77				
1996	1.76				
2001	1.67	1.67	1.67	1.32	1.32
2015	1.52	1.52	1.52	1.32	1.32
2030	1.43	1.43	1.43	1.32	1.32

**Supplemental Table 3.11a Unit Energy Consumption for New Electric Oven  
AEO 1995 Case (Weighted-Average kWh/year)**

Year	Base	Standard Level			
		1	2	3	3A
1981	289				
1993	291				
1996	293				
2001	294	290	286	286	294
2015	297	294	292	292	297
2030	301	299	298	298	301

**Supplemental Table 3.12a Unit Energy Consumption for New Gas Oven  
AEO 1995 Case (Weighted-Average Million Btu/Year)**

Year	Base	Standard Level			
		1	2	3	3A
1981	2.10				
1993	1.90				
1996	1.90				
2001	1.85	1.85	1.85	1.58	1.58
2015	1.74	1.74	1.74	1.60	1.60

	2030	1.68	1.68	1.68	1.62	1.62
<b><i>Unit Energy Consumption, AEO 1997 Case</i></b>						

**Supplemental Table 3.9b Unit Energy Consumption for New Electric Cooktops  
AEO 1997 Case (Weighted-Average kWh/year)**

Year	Base	Standard Level			
		1	2	3	3A
1981	235				
1993	235				
1996	235				
2001	235	235	235	235	235
2015	235	235	235	235	235
2030	235	235	235	235	235

**Supplemental Table 3.10b Unit Energy Consumption for New Gas Cooktops  
AEO 1997 Case (Weighted-Average Million Btu/Year)**

Year	Base	Standard Level			
		1	2	3	3A
1981	2.17				
1993	1.77				
1996	1.76				
2001	1.67	1.67	1.67	1.32	1.32
2015	1.52	1.52	1.52	1.32	1.32
2030	1.43	1.43	1.43	1.32	1.32

**Supplemental Table 3.11b Unit Energy Consumption for New Electric Oven  
AEO 1997 Case (Weighted-Average kWh/year)**

Year	Base	Standard Level			
		1	2	3	3A
1981	289				
1993	291				
1996	293				
2001	294	290	286	286	294
2015	297	294	292	292	297
2030	301	299	298	298	301

**Supplemental Table 3.12b Unit Energy Consumption for New Gas Oven  
AEO 1997 Case (Weighted-Average Million Btu/Year)**

Year	Base	Standard Level			
		1	2	3	3A
1981	2.10				
1993	1.90				
1996	1.90				
2001	1.85	1.85	1.85	1.58	1.58

2015	1.74	1.74	1.74	1.60	1.60
2030	1.68	1.68	1.68	1.62	1.62

***Unit Energy Consumption, GRI 1997 Case***

**Supplemental Table 3.9c Unit Energy Consumption for New Electric Cooktops  
GRI 1997 Case (Weighted-Average kWh/year)**

Year	Base	Standard Level			
		1	2	3	3A
1981	235				
1993	235				
1996	235				
2001	235	235	235	235	235
2015	235	235	235	235	235
2030	235	235	235	235	235

**Supplemental Table 3.10c Unit Energy Consumption for New Gas Cooktops  
GRI 1997 Case (Weighted-Average Million Btu/Year)**

Year	Base	Standard Level			
		1	2	3	3A
1981	2.17				
1993	1.77				
1996	1.76				
2001	1.67	1.67	1.67	1.32	1.32
2015	1.52	1.52	1.52	1.32	1.32
2030	1.43	1.43	1.43	1.32	1.32

**Supplemental Table 3.11c Unit Energy Consumption for New Electric Oven  
GRI 1997 Case (Weighted-Average kWh/year)**

Year	Base	Standard Level			
		1	2	3	3A
1981	289				
1993	291				
1996	293				
2001	294	290	286	286	294
2015	297	294	292	292	297
2030	301	299	298	298	301

**Supplemental Table 3.12c Unit Energy Consumption for New Gas Oven  
GRI 1997 Case (Weighted-Average Million Btu/Year)**

Year	Base	Standard Level			
		1	2	3	3A
1981	2.10				
1993	1.90				
1996	1.90				

2001	1.85	1.85	1.85	1.58	1.58
2015	1.74	1.74	1.74	1.60	1.60
2030	1.68	1.68	1.68	1.62	1.62

**National Energy Consumption, AEO 1995 Case**

**Supplemental Table 3.13a U.S. Energy Consumption for Electric Cooktops  
AEO 1995 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.12				
1993	0.14				
1996	0.15				
2001	0.16	0.16	0.16	0.16	0.16
2015	0.18	0.18	0.18	0.18	0.18
2030	0.19	0.19	0.19	0.19	0.19
2001-2030	5.28	5.28	5.28	5.28	5.28
Cumulative Savings:	0.00	0.00	0.00	0.00	0.00
Percent of Base:	0.0%	0.0%	0.0%	0.0%	0.0%

**Supplemental Table 3.14a U.S. Energy Consumption for Gas Cooktops  
AEO 1995 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.12				
1993	0.10				
1996	0.09				
2001	0.08	0.08	0.08	0.08	0.08
2015	0.08	0.08	0.08	0.07	0.07
2030	0.09	0.09	0.09	0.08	0.08
2001-2030	2.44	2.44	2.44	2.19	2.19
Cumulative Savings:	0.00	0.00	0.24	0.24	0.24
Percent of Base:	0.0%	0.0%	10.0%	10.0%	10.0%

**Supplemental Table 3.15a U.S. Energy Consumption for Electric + Gas Cooktops  
AEO 1995 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.24				
1993	0.24				
1996	0.24				
2001	0.24	0.24	0.24	0.24	0.24
2015	0.26	0.26	0.26	0.25	0.25
2030	0.28	0.28	0.28	0.27	0.27

2001-2030	7.70	7.70	7.70	7.47	7.47
Cumulative Savings:	0.00	0.00	0.24	0.24	
Percent of Base:	0.0%	0.0%	3.1%	3.1%	

**National Energy Consumption, AEO 1995 Case**

**Supplemental Table 3.16a U.S. Energy Consumption for Electric Ovens  
AEO 1995 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.15				
1993	0.18				
1996	0.19				
2001	0.21	0.21	0.21	0.21	0.21
2015	0.24	0.23	0.23	0.23	0.24
2030	0.28	0.27	0.27	0.27	0.28
2001-2030	7.14	7.09	7.04	7.10	7.19
Cumulative Savings:	0.05	0.09	0.04	-0.06	
Percent of Base:	0.6%	1.3%	0.5%	-0.8%	

**Supplemental Table 3.17a U.S. Energy Consumption for Gas Ovens  
AEO 1995 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.09				
1993	0.09				
1996	0.08				
2001	0.08	0.08	0.08	0.08	0.08
2015	0.09	0.09	0.09	0.08	0.08
2030	0.09	0.09	0.09	0.09	0.09
2001-2030	2.58	2.58	2.58	2.39	2.39
Cumulative Savings:	0.00	0.00	0.19	0.19	
Percent of Base:	0.0%	0.0%	7.4%	7.4%	

**Supplemental Table 3.18a U.S. Energy Consumption for Electric + Gas Ovens  
AEO 1995 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.24				
1993	0.27				
1996	0.28				
2001	0.29	0.29	0.29	0.29	0.29
2015	0.32	0.32	0.32	0.31	0.32
2030	0.37	0.37	0.36	0.36	0.36
2001-2030	9.71	9.67	9.63	9.49	9.58

Cumulative Savings:	0.04	0.08	0.22	0.13
Percent of Base:	0.5%	0.9%	2.3%	1.4%

*National Energy Consumption, AEO 1997 Case*

**Supplemental Table 3.13b U.S. Energy Consumption for Electric Cooktops  
AEO 1997 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.12				
1993	0.15				
1996	0.16				
2001	0.17	0.17	0.17	0.17	0.17
2015	0.20	0.20	0.20	0.20	0.20
2030	0.22	0.22	0.22	0.23	0.23
2001-2030	5.87	5.87	5.87	5.89	5.89
Cumulative Savings:	0.00	0.00	-0.01	-0.01	
Percent of Base:	0.0%	0.0%	-0.2%	-0.2%	

**Supplemental Table 3.14b U.S. Energy Consumption for Gas Cooktops  
AEO 1997 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.12				
1993	0.10				
1996	0.09				
2001	0.08	0.08	0.08	0.08	0.08
2015	0.09	0.09	0.09	0.08	0.08
2030	0.10	0.10	0.10	0.09	0.09
2001-2030	2.65	2.65	2.65	2.38	2.38
Cumulative Savings:	0.00	0.00	0.27	0.27	
Percent of Base:	0.0%	0.0%	10.1%	10.1%	

**Supplemental Table 3.15b U.S. Energy Consumption for Electric + Gas Cooktops  
AEO 1997 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.24				
1993	0.25				
1996	0.26				
2001	0.25	0.25	0.25	0.25	0.25
2015	0.28	0.28	0.28	0.27	0.27
2030	0.32	0.32	0.32	0.31	0.31
2001-2030	8.53	8.53	8.53	8.27	8.27
Cumulative Savings:	0.00	0.00	0.26	0.26	
Percent of Base:	0.0%	0.0%	3.1%	3.1%	

**National Energy Consumption, AEO 1997 Case**

**Supplemental Table 3.16b U.S. Energy Consumption for Electric Ovens  
AEO 1997 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.15				
1993	0.19				
1996	0.20				
2001	0.21	0.21	0.21	0.21	0.21
2015	0.26	0.26	0.25	0.26	0.26
2030	0.30	0.30	0.30	0.30	0.31
2001-2030	7.74	7.69	7.65	7.71	7.81
Cumulative Savings:		0.05	0.10	0.03	-0.06
Percent of Base:		0.6%	1.3%	0.4%	-0.8%

**Supplemental Table 3.17b U.S. Energy Consumption for Gas Ovens  
AEO 1997 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.09				
1993	0.09				
1996	0.09				
2001	0.09	0.09	0.09	0.09	0.09
2015	0.10	0.10	0.10	0.09	0.09
2030	0.11	0.11	0.11	0.10	0.10
2001-2030	2.87	2.87	2.88	2.66	2.66
Cumulative Savings:		0.00	0.00	0.22	0.22
Percent of Base:		0.0%	0.0%	7.5%	7.5%

**Supplemental Table 3.18b U.S. Energy Consumption for Electric + Gas Ovens  
AEO 1997 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.24				
1993	0.27				
1996	0.28				
2001	0.30	0.30	0.30	0.30	0.30
2015	0.35	0.35	0.35	0.34	0.35
2030	0.41	0.41	0.41	0.40	0.40
2001-2030	10.62	10.57	10.52	10.37	10.46
Cumulative Savings:		0.05	0.10	0.25	0.16

Percent of Base:	0.4%	0.9%	2.3%	1.5%
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*National Energy Consumption, GRI 1997 Case*

**Supplemental Table 3.13c U.S. Energy Consumption for Electric Cooktops  
GRI 1997 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.12				
1993	0.15				
1996	0.16				
2001	0.17	0.17	0.17	0.17	0.17
2015	0.20	0.20	0.20	0.20	0.20
2030	0.23	0.23	0.23	0.23	0.23
2001-2030	6.01	6.01	6.01	6.01	6.01
Cumulative Savings:	0.00	0.00	-0.01	-0.01	
Percent of Base:	0.0%	0.0%	-0.1%	-0.1%	

**Supplemental Table 3.14c U.S. Energy Consumption for Gas Cooktops  
GRI 1997 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.12				
1993	0.10				
1996	0.09				
2001	0.08	0.08	0.08	0.08	0.08
2015	0.09	0.09	0.09	0.08	0.08
2030	0.09	0.09	0.09	0.08	0.08
2001-2030	2.62	2.62	2.62	2.36	2.36
Cumulative Savings:	0.00	0.00	0.26	0.26	
Percent of Base:	0.0%	0.0%	10.1%	10.1%	

**Supplemental Table 3.15c U.S. Energy Consumption for Electric + Gas Cooktops  
GRI 1997 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.24				
1993	0.25				
1996	0.26				
2001	0.25	0.25	0.25	0.25	0.25
2015	0.29	0.29	0.29	0.28	0.28
2030	0.33	0.33	0.33	0.32	0.32
2001-2030	8.67	8.67	8.67	8.37	8.37
Cumulative Savings:	0.00	0.00	0.26	0.26	
Percent of Base:	0.0%	0.0%	3.0%	3.0%	

**National Energy Consumption, GRI 1997 Case**

**Supplemental Table 3.16c U.S. Energy Consumption for Electric Ovens  
GRI 1997 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.15				
1993	0.19				
1996	0.20				
2001	0.21	0.21	0.21	0.21	0.21
2015	0.26	0.26	0.26	0.26	0.26
2030	0.31	0.31	0.31	0.31	0.31
2001-2030	7.87	7.82	7.77	7.83	7.93
Cumulative Savings:		0.05	0.10	0.04	-0.07
Percent of Base:		0.6%	1.3%	0.4%	-0.9%

**Supplemental Table 3.17c U.S. Energy Consumption for Gas Ovens  
GRI 1997 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.09				
1993	0.09				
1996	0.09				
2001	0.09	0.09	0.09	0.09	0.09
2015	0.10	0.10	0.10	0.09	0.09
2030	0.10	0.10	0.11	0.10	0.10
2001-2030	2.86	2.86	2.87	2.65	2.64
Cumulative Savings:		0.00	-0.01	0.21	0.22
Percent of Base:		0.0%	-0.2%	7.4%	7.8%

**Supplemental Table 3.18c U.S. Energy Consumption for Electric + Gas Ovens  
GRI 1997 Case (Quadrillion Btu, Primary)**

Year	Base	Standard Level			
		1	2	3	3A
1981	0.24				
1993	0.27				
1996	0.28				
2001	0.30	0.30	0.30	0.30	0.30
2015	0.36	0.35	0.35	0.35	0.35
2030	0.42	0.41	0.41	0.41	0.41
2001-2030	10.73	10.67	10.63	10.48	10.57
Cumulative Savings:		0.05	0.10	0.25	0.15

Percent of Base:	0.5%	0.9%	2.3%	1.4%
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### 3.3 EQUIPMENT INSTALLATIONS

Supplemental Tables 3.19a to 3.20a show the cumulative installations of cooktops and ovens from 2001 to 2030 for the AEO 1995 case. Supplemental Tables 3.19b to 3.20b show the results for the AEO 1997 case and Supplemental Tables 3.19c to 3.20c show the results of the GRI 1997 case.

#### *Cumulative Installations, AEO 1995 Case*

**Supplemental Table 3.19a Cumulative Installations of Cooktops (Millions)  
AEO 1995 case**

2001-2030	Base	Standard Level			
		1	2	3	3A
Electric	122.9	122.9	122.9	123.0	123.0
Gas	83.0	83.0	83.0	82.9	82.9
Total	205.9	205.9	205.9	205.9	205.9
<b>Change from Base:</b>					
Electric	0.0	0.0	0.1	0.1	0.1
Gas	0.0	0.0	-0.1	-0.1	-0.1
Total	0.0	0.0	0.0	0.0	0.0
<b>Percent Change:</b>					
Electric	0.0%	0.0%	0.1%	0.1%	0.1%
Gas	0.0%	0.0%	-0.1%	-0.1%	-0.1%
Total	0.0%	0.0%	0.0%	0.0%	0.0%

**Supplemental Table 3.20a Cumulative Installations of Ovens (Millions)  
AEO 1995 Case**

2001-2030	Base	Standard Level			
		1	2	3	3A
Electric	116.0	116.0	115.9	115.8	115.9
Gas	88.1	88.1	88.2	88.3	88.2
Total	204.1	204.1	204.1	204.1	204.1
<b>Change from Base:</b>					
Electric	0.0	-0.1	-0.2	-0.1	-0.1
Gas	0.0	0.1	0.2	0.1	0.1
Total	0.0	0.0	0.0	0.0	0.0
<b>Percent Change:</b>					
Electric	0.0%	-0.1%	-0.2%	-0.1%	-0.1%
Gas	0.0%	0.1%	0.2%	0.1%	0.1%
Total	0.0%	0.0%	0.0%	0.0%	0.0%

*Cumulative Installations, AEO 1997 Case*

**Supplemental Table 3.19b Cumulative Installations of Cooktops (Millions)  
AEO 1997 Case**

2001-2030	Base	Standard Level			3A
		1	2	3	
Electric	131.8	131.8	131.8	132.0	132.0
Gas	88.3	88.3	88.3	88.1	88.1
Total	220.1	220.1	220.1	220.1	220.1
<b>Change from Base:</b>					
Electric	0.0	0.0	0.2	0.2	
Gas	0.0	0.0	-0.2	-0.2	
Total	0.0	0.0	0.0	0.0	
<b>Percent Change:</b>					
Electric	0.0%	0.0%	0.2%	0.2%	
Gas	0.0%	0.0%	-0.2%	-0.2%	
Total	0.0%	0.0%	0.0%	0.0%	

**Supplemental Table 3.20b Cumulative Installations of Ovens (Millions)  
AEO 1997 Case**

2001-2030	Base	Standard Level			3A
		1	2	3	
Electric	121.9	121.9	121.8	121.8	121.9
Gas	96.3	96.3	96.4	96.4	96.3
Total	218.2	218.2	218.2	218.2	218.2
<b>Change from Base:</b>					
Electric	0.0	-0.1	-0.1	0.0	
Gas	0.0	0.1	0.1	0.0	
Total	0.0	0.0	0.0	0.0	
<b>Percent Change:</b>					
Electric	0.0%	-0.1%	-0.1%	0.0%	
Gas	0.0%	0.1%	0.1%	0.0%	
Total	0.0%	0.0%	0.0%	0.0%	

*Cumulative Installations, GRI 1997 Case*

**Supplemental Table 3.19c Cumulative Installations of Cooktops (Millions)  
GRI 1997 Case**

2001-2030	Base	Standard Level			
		1	2	3	3A
Electric	133.2	133.2	133.2	133.4	133.4
Gas	86.9	86.9	86.9	86.7	86.7
Total	220.1	220.1	220.1	220.1	220.1
<b>Change from Base:</b>					
Electric		0.0	0.0	0.2	0.2
Gas		0.0	0.0	-0.2	-0.2
Total		0.0	0.0	0.0	0.0
<b>Percent Change:</b>					
Electric		0.0%	0.0%	0.2%	0.2%
Gas		0.0%	0.0%	-0.2%	-0.2%
Total		0.0%	0.0%	0.0%	0.0%

**Supplemental Table 3.20c Cumulative Installations of Ovens (Millions)  
GRI 1997 Case**

2001-2030	Base	Standard Level			
		1	2	3	3A
Electric	122.5	122.5	122.4	122.4	122.5
Gas	95.7	95.7	95.8	95.8	95.7
Total	218.2	218.2	218.2	218.2	218.2
<b>Change from Base:</b>					
Electric		0.0	-0.1	-0.1	0.0
Gas		0.0	0.1	0.1	0.0
Total		0.0	0.0	0.0	0.0
<b>Percent Change:</b>					
Electric		0.0%	-0.1%	-0.1%	0.0%
Gas		0.0%	0.1%	0.1%	0.0%
Total		0.0%	0.0%	0.0%	0.0%

### **3.4 APPLIANCE PRICES**

Projections of the purchase prices for new cooktops and ovens in 1990 dollars are shown in Supplemental Tables 3.21a to 3.24a for the AEO 1995 case, Supplemental Tables 3.21b to 3.24b for the AEO 1997 case, and Supplemental Tables 3.21c to 3.24c for the GRI 1997 case. The purchase prices of cooktops and ovens are the same in the base case for the three scenarios except in the case of electric cooktops. For the AEO 1995 case, which shows a positive growth in electricity price, the LBNL-REM model forecasts an increase in average efficiency for electric cooktops after 2010, thus results in an increase in purchase price.

*Purchase Prices, AEO 1995 Case*

**Supplemental Table 3.21a Average Purchase Price for New Electric Cooktop  
AEO 1995 Case (1990 Dollars Per Unit)**

Year	Base	Standard Level			
		1	2	3	3A
1981	194				
1993	194				
1996	194				
2001	194	194	194	194	194
2015	198	198	198	198	198
2030	198	198	198	198	198

**Supplemental Table 3.22a Average Purchase Price for New Gas Cooktop  
AEO 1995 Case (1990 Dollars Per Unit)**

Year	Base	Standard Level			
		1	2	3	3A
1981	237				
1993	243				
1996	243				
2001	245	245	245	249	249
2015	247	247	247	249	249
2030	248	248	248	249	249

**Supplemental Table 3.23a Average Purchase Price for New Electric Oven  
AEO 1995 Case (1990 Dollars Per Unit)**

Year	Base	Standard Level			
		1	2	3	3A
1981	450				
1993	458				
1996	465				
2001	467	468	471	471	467
2015	479	480	482	482	479
2030	492	492	493	493	492

**Supplemental Table 3.24a Average Purchase Price for New Gas Oven  
AEO 1995 Case (1990 Dollars Per Unit)**

Year	Base	Standard Level			
		1	2	3	3A
1981	510				
1993	525				
1996	528				
2001	532	532	532	537	537
2015	546	546	546	549	549
2030	561	561	561	562	562

*Purchase Prices, AEO 1997 Case*

**Supplemental Table 3.21b Average Purchase Price for New Electric Cooktop  
AEO 1997 Case (1990 Dollars per Unit)**

Year	Base	Standard Level			3A
		1	2	3	
1981	194				
1993	194				
1996	194				
2001	194	194	194	194	194
2015	194	194	194	194	194
2030	194	194	194	194	194

**Supplemental Table 3.22b Average Purchase Price for New Gas Cooktop  
AEO 1997 Case (1990 Dollars per Unit)**

Year	Base	Standard Level			3A
		1	2	3	
1981	237				
1993	243				
1996	243				
2001	245	245	245	249	249
2015	247	247	247	249	249
2030	248	248	248	249	249

**Supplemental Table 3.23b Average Purchase Price for New Electric Oven  
AEO 1997 Case (1990 Dollars per Unit)**

Year	Base	Standard Level			3A
		1	2	3	
1981	450				
1993	458				
1996	465				
2001	467	468	471	471	467
2015	479	480	482	482	479
2030	492	492	493	493	492

**Supplemental Table 3.24b Average Purchase Price for New Gas Oven  
AEO 1997 Case (1990 Dollars per Unit)**

Year	Base	Standard Level			3A
		1	2	3	
1981	510				
1993	525				
1996	528				
2001	532	532	532	537	537
2015	546	546	546	549	549
2030	561	561	561	562	562

*Purchase Prices, GRI 1997 Case*

**Supplemental Table 3.21c Average Purchase Price for New Electric Cooktop  
GRI 1997 Case (1990 Dollars Per Unit)**

Year	Base	Standard Level			
		1	2	3	3A
1981	194				
1993	194				
1996	194				
2001	194	194	194	194	194
2015	194	194	194	194	194
2030	194	194	194	194	194

**Supplemental Table 3.22c Average Purchase Price for New Gas Cooktop  
GRI 1997 Case (1990 Dollars Per Unit)**

Year	Base	Standard Level			
		1	2	3	3A
1981	237				
1993	243				
1996	243				
2001	245	245	245	249	249
2015	247	247	247	249	249
2030	248	248	248	249	249

**Supplemental Table 3.23c Average Purchase Price for New Electric Oven  
GRI 1997 Case (1990 Dollars Per Unit)**

Year	Base	Standard Level			
		1	2	3	3A
1981	450				
1993	458				
1996	465				
2001	467	468	471	471	467
2015	479	480	482	482	479
2030	492	492	493	493	492

**Supplemental Table 3.24c Average Purchase Price for New Gas Oven  
GRI 1997 Case (1990 Dollars Per Unit)**

Year	Base	Standard Level			
		1	2	3	3A
1981	510				
1993	525				
1996	528				
2001	532	532	532	537	537
2015	546	546	546	549	549
2030	561	561	561	562	562

### **3.5 NET PRESENT VALUE**

The net present value (NPV) of standards for cooktops and ovens is calculated by first determining the difference in present value of unit life-cycle costs between the base case and standards case each year. That difference is then multiplied by the standards case shipments for the year. The NPV for the period (2001-2030) is the sum over the years of the annual values. A positive NPV of standards results when the new units in the standards case have lower present value of life-cycle cost than do new units in the base case. Supplemental Tables 3.25a through 3.30a show the NPV to society of the standards levels for the AEO 1995 case. Supplemental Tables 3.25b through 3.30b show the NPV for the AEO 1997 case while Supplemental Tables 3.25c to 3.30c show the results for the GRI 1997 case.

*Net Present Value, AEO 1995 Case*

**Supplemental Table 3.25a Net Present Value for Cooktops Purchased from 2001-2030  
AEO 1995 Case**  
**(Billion 1990\$ Discounted to 1990 at 4%)**

	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.38	0.38
TOTAL BENEFIT (energy):	0.00	0.00	0.38	0.38
<b>Equipment costs:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.10	0.10
TOTAL COST (equipment):	0.00	0.00	0.10	0.10
<b>NPV = benefit - cost:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.28	0.28
<b>TOTAL across fuels:</b>	<b>0.00</b>	<b>0.00</b>	<b>0.28</b>	<b>0.28</b>
<b>RATIO: benefit/cost:</b>	N/A	N/A	3.8	3.8

**Supplemental Table 3.26a Net Present Value for Ovens Purchased from 2001-2030  
AEO 1995 Case**  
**(Billion 1990\$ Discounted to 1990 at 4%)**

	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.13	0.25	0.25	0.00
Gas	0.00	0.00	0.43	0.43
TOTAL BENEFIT (energy):	0.13	0.25	0.68	0.43
<b>Equipment costs:</b>				
Electric	0.04	0.12	0.12	0.00
Gas	0.00	0.00	0.10	0.10
TOTAL COST (equipment):	0.04	0.12	0.22	0.10
<b>NPV = benefit - cost:</b>				
Electric	0.09	0.13	0.13	0.00
Gas	0.00	0.00	0.33	0.33
<b>TOTAL across fuels:</b>	<b>0.09</b>	<b>0.13</b>	<b>0.46</b>	<b>0.33</b>
<b>RATIO: benefit/cost:</b>	3.3	2.1	3.1	4.4

*Net Present Value, AEO 1995 Case*

**Supplemental Table 3.27a Net Present Value for Cooktops Purchased from 2001-2030  
AEO 1995 Case  
(Billion 1990\$ Discounted to 1990 at 7%)**

	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.17	0.17
TOTAL BENEFIT (energy):	0.00	0.00	0.17	0.17
<b>Equipment costs:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.06	0.06
TOTAL COST (equipment):	0.00	0.00	0.06	0.06
<b>NPV = benefit - cost:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.12	0.12
<b>TOTAL across fuels:</b>	<b>0.00</b>	<b>0.00</b>	<b>0.12</b>	<b>0.12</b>
<b>RATIO: benefit/cost:</b>	N/A	N/A	3.1	3.1

**Supplemental Table 3.28a Net Present Value for Ovens Purchased from 2001-2030  
AEO 1995 Case  
(Billion 1990\$ Discounted to 1990 at 7%)**

	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.06	0.12	0.12	0.00
Gas	0.00	0.00	0.20	0.20
TOTAL BENEFIT (energy):	0.06	0.12	0.32	0.20
<b>Equipment costs:</b>				
Electric	0.02	0.07	0.07	0.00
Gas	0.00	0.00	0.06	0.06
TOTAL COST (equipment):	0.02	0.07	0.12	0.06
<b>NPV = benefit - cost:</b>				
Electric	0.04	0.05	0.05	0.00
Gas	0.00	0.00	0.15	0.15
<b>TOTAL across fuels:</b>	<b>0.04</b>	<b>0.05</b>	<b>0.20</b>	<b>0.15</b>
<b>RATIO: benefit/cost:</b>	2.7	1.7	2.6	3.6

*Net Present Value, AEO 1995 Case*

**Supplemental Table 3.29a Net Present Value for Cooktops Purchased from 2001-2030  
AEO 1995 Case**  
**(Billion 1990\$ Discounted to 1990 at 10%)**

	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.09	0.09
TOTAL BENEFIT (energy):	0.00	0.00	0.09	0.09
<b>Equipment costs:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.03	0.03
TOTAL COST (equipment):	0.00	0.00	0.03	0.03
<b>NPV = benefit - cost:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.05	0.05
<b>TOTAL across fuels:</b>	<b>0.00</b>	<b>0.00</b>	<b>0.05</b>	<b>0.05</b>
<b>RATIO: benefit/cost:</b>	N/A	N/A	2.5	2.5

**Supplemental Table 3.30a Net Present Value for Ovens Purchased from 2001-2030  
AEO 1995 Case**  
**(Billion 1990\$ Discounted to 1990 at 10%)**

	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.03	0.06	0.06	0.00
Gas	0.00	0.00	0.10	0.10
TOTAL BENEFIT (energy):	0.03	0.06	0.16	0.10
<b>Equipment costs:</b>				
Electric	0.01	0.04	0.04	0.00
Gas	0.00	0.00	0.03	0.03
TOTAL COST (equipment):	0.01	0.04	0.07	0.03
<b>NPV = benefit - cost:</b>				
Electric	0.02	0.02	0.02	0.00
Gas	0.00	0.00	0.07	0.07
<b>TOTAL across fuels:</b>	<b>0.02</b>	<b>0.02</b>	<b>0.09</b>	<b>0.07</b>
<b>RATIO: benefit/cost:</b>	2.3	1.4	2.2	3.0

*Net Present Value, AEO 1997 Case*

**Supplemental Table 3.25b Net Present Value for Cooktops Purchased from 2001-2030  
AEO 1997 Case**  
**(Billion 1990\$ Discounted to 1990 at 4%)**

	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.17	0.17
TOTAL BENEFIT (energy):	0.00	0.00	0.17	0.17
<b>Equipment costs:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.11	0.11
TOTAL COST (equipment):	0.00	0.00	0.11	0.11
<b>NPV = benefit - cost:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.06	0.06
<b>TOTAL across fuels:</b>	<b>0.00</b>	<b>0.00</b>	<b>0.06</b>	<b>0.06</b>
<b>RATIO: benefit/cost:</b>	N/A	N/A	1.6	1.6

**Supplemental Table 3.26b Net Present Value for Ovens Purchased from 2001-2030  
AEO 1997 Case**  
**(Billion 1990\$ Discounted to 1990 at 4%)**

	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.11	0.21	0.21	0.00
Gas	0.00	0.00	0.31	0.30
TOTAL BENEFIT (energy):	0.11	0.21	0.52	0.30
<b>Equipment costs:</b>				
Electric	0.04	0.13	0.13	0.00
Gas	0.00	0.00	0.11	0.11
TOTAL COST (equipment):	0.04	0.13	0.23	0.11
<b>NPV = benefit - cost:</b>				
Electric	0.07	0.09	0.09	0.00
Gas	0.00	0.00	0.20	0.20
<b>TOTAL across fuels:</b>	<b>0.07</b>	<b>0.09</b>	<b>0.29</b>	<b>0.20</b>
<b>RATIO: benefit/cost:</b>	2.7	1.7	2.2	2.8

*Net Present Value, AEO 1997 Case*

**Supplemental Table 3.27b Net Present Value for Cooktops Purchased from 2001-2030  
AEO 1997 Case  
(Billion 1990\$ Discounted to 1990 at 7%)**

	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.08	0.08
TOTAL BENEFIT (energy):	0.00	0.00	0.08	0.08
<b>Equipment costs:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.06	0.06
TOTAL COST (equipment):	0.00	0.00	0.06	0.06
<b>NPV = benefit - cost:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.02	0.02
<b>TOTAL across fuels:</b>	<b>0.00</b>	<b>0.00</b>	<b>0.02</b>	<b>0.02</b>
<b>RATIO: benefit/cost:</b>	N/A	N/A	1.3	1.3

**Supplemental Table 3.28b Net Present Value for Ovens Purchased from 2001-2030  
AEO 1997 Case  
(Billion 1990\$ Discounted to 1990 at 7%)**

	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.05	0.10	0.10	0.00
Gas	0.00	0.00	0.15	0.15
TOTAL BENEFIT (energy):	0.05	0.10	0.25	0.15
<b>Equipment costs:</b>				
Electric	0.02	0.07	0.07	0.00
Gas	0.00	0.00	0.06	0.06
TOTAL COST (equipment):	0.02	0.07	0.13	0.06
<b>NPV = benefit - cost:</b>				
Electric	0.03	0.03	0.03	0.00
Gas	0.00	0.00	0.09	0.09
<b>TOTAL across fuels:</b>	<b>0.03</b>	<b>0.03</b>	<b>0.12</b>	<b>0.09</b>
<b>RATIO: benefit/cost:</b>	2.3	1.4	1.9	2.4

*Net Present Value, AEO 1997 Case*

**Supplemental Table 3.29b Net Present Value for Cooktops Purchased from 2001-2030  
AEO 1997 Case**  
**(Billion 1990\$ Discounted to 1990 at 10%)**

	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.04	0.04
TOTAL BENEFIT (energy):	0.00	0.00	0.04	0.04
<b>Equipment costs:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.04	0.04
TOTAL COST (equipment):	0.00	0.00	0.04	0.04
<b>NPV = benefit - cost:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.01	0.01
<b>TOTAL across fuels:</b>	<b>0.00</b>	<b>0.00</b>	<b>0.01</b>	<b>0.01</b>
<b>RATIO: benefit/cost:</b>	N/A	N/A	1.2	1.2

**Supplemental Table 3.30b Net Present Value for Ovens Purchased from 2001-2030  
AEO 1997 Case**  
**(Billion 1990\$ Discounted to 1990 at 10%)**

	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.03	0.05	0.05	0.00
Gas	0.00	0.00	0.08	0.08
TOTAL BENEFIT (energy):	0.03	0.05	0.13	0.08
<b>Equipment costs:</b>				
Electric	0.01	0.04	0.04	0.00
Gas	0.00	0.00	0.04	0.04
TOTAL COST (equipment):	0.01	0.04	0.08	0.04
<b>NPV = benefit - cost:</b>				
Electric	0.01	0.01	0.01	0.00
Gas	0.00	0.00	0.04	0.04
<b>TOTAL across fuels:</b>	<b>0.01</b>	<b>0.01</b>	<b>0.05</b>	<b>0.04</b>
<b>RATIO: benefit/cost:</b>	1.9	1.2	1.6	2.0

*Net Present Value, GRI 1997 Case*

**Supplemental Table 3.25c Net Present Value for Cooktops Purchased from 2001-2030  
GRI 1997 Case**

<b>(Billion 1990\$ Discounted to 1990 at 4%)</b>				
	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.16	0.16
<b>TOTAL BENEFIT (energy):</b>	<b>0.00</b>	<b>0.00</b>	<b>0.16</b>	<b>0.16</b>
<b>Equipment costs:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.10	0.10
<b>TOTAL COST (equipment):</b>	<b>0.00</b>	<b>0.00</b>	<b>0.10</b>	<b>0.10</b>
<b>NPV = benefit - cost:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.06	0.06
<b>TOTAL across fuels:</b>	<b>0.00</b>	<b>0.00</b>	<b>0.06</b>	<b>0.06</b>
<b>RATIO: benefit/cost:</b>	N/A	N/A	1.5	1.5

**Supplemental Table 3.26c Net Present Value for Ovens Purchased from 2001-2030  
GRI 1997 Case**

<b>(Billion 1990\$ Discounted to 1990 at 4%)</b>				
	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.09	0.19	0.19	0.00
Gas	0.00	0.00	0.32	0.32
<b>TOTAL BENEFIT (energy):</b>	<b>0.09</b>	<b>0.19</b>	<b>0.51</b>	<b>0.32</b>
<b>Equipment costs:</b>				
Electric	0.04	0.13	0.13	0.00
Gas	0.00	0.00	0.11	0.11
<b>TOTAL COST (equipment):</b>	<b>0.04</b>	<b>0.13</b>	<b>0.23</b>	<b>0.11</b>
<b>NPV = benefit - cost:</b>				
Electric	0.05	0.06	0.06	0.00
Gas	0.00	0.00	0.21	0.21
<b>TOTAL across fuels:</b>	<b>0.05</b>	<b>0.06</b>	<b>0.27</b>	<b>0.21</b>
<b>RATIO: benefit/cost:</b>	2.4	1.5	2.2	3.0

*Net Present Value, GRI 1997 Case*

**Supplemental Table 3.27c Net Present Value for Cooktops Purchased from 2001-2030  
GRI 1997 Case**

<b>(Billion 1990\$ Discounted to 1990 at 7%)</b>				
	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.08	0.08
<b>TOTAL BENEFIT (energy):</b>	<b>0.00</b>	<b>0.00</b>	<b>0.08</b>	<b>0.08</b>
<b>Equipment costs:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.06	0.06
<b>TOTAL COST (equipment):</b>	<b>0.00</b>	<b>0.00</b>	<b>0.06</b>	<b>0.06</b>
<b>NPV = benefit - cost:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.02	0.02
<b>TOTAL across fuels:</b>	<b>0.00</b>	<b>0.00</b>	<b>0.02</b>	<b>0.02</b>
<b>RATIO: benefit/cost:</b>	N/A	N/A	1.3	1.3

**Supplemental Table 3.28c Net Present Value for Ovens Purchased from 2001-2030  
GRI 1997 Case**

<b>(Billion 1990\$ Discounted to 1990 at 7%)</b>				
	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.04	0.09	0.09	0.00
Gas	0.00	0.00	0.15	0.15
<b>TOTAL BENEFIT (energy):</b>	<b>0.04</b>	<b>0.09</b>	<b>0.24</b>	<b>0.15</b>
<b>Equipment costs:</b>				
Electric	0.02	0.07	0.07	0.00
Gas	0.00	0.00	0.06	0.06
<b>TOTAL COST (equipment):</b>	<b>0.02</b>	<b>0.07</b>	<b>0.13</b>	<b>0.06</b>
<b>NPV = benefit - cost:</b>				
Electric	0.02	0.02	0.02	0.00
Gas	0.00	0.00	0.09	0.09
<b>TOTAL across fuels:</b>	<b>0.02</b>	<b>0.02</b>	<b>0.11</b>	<b>0.09</b>
<b>RATIO: benefit/cost:</b>	2.0	1.2	1.8	2.5

*Net Present Value, GRI 1997 Case*

**Supplemental Table 3.29c Net Present Value for Cooktops Purchased from 2001-2030  
GRI 1997 Case**

<b>(Billion 1990\$ Discounted to 1990 at 10%)</b>				
	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.04	0.04
<b>TOTAL BENEFIT (energy):</b>	0.00	0.00	0.04	0.04
<b>Equipment costs:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.04	0.04
<b>TOTAL COST (equipment):</b>	0.00	0.00	0.04	0.04
<b>NPV = benefit - cost:</b>				
Electric	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.01	0.01
<b>TOTAL across fuels:</b>	<b>0.00</b>	<b>0.00</b>	<b>0.01</b>	<b>0.01</b>
<b>RATIO: benefit/cost:</b>	N/A	N/A	1.2	1.2

**Supplemental Table 3.30c Net Present Value for Ovens Purchased from 2001-2030  
GRI 1997 Case**

<b>(Billion 1990\$ Discounted to 1990 at 10%)</b>				
	Standard Level			
	1	2	3	3A
<b>Fuel costs savings:</b>				
Electric	0.02	0.05	0.05	0.00
Gas	0.00	0.00	0.08	0.08
<b>TOTAL BENEFIT (energy):</b>	0.02	0.05	0.13	0.08
<b>Equipment costs:</b>				
Electric	0.01	0.04	0.04	0.00
Gas	0.00	0.00	0.04	0.04
<b>TOTAL COST (equipment):</b>	0.01	0.04	0.08	0.04
<b>NPV = benefit - cost:</b>				
Electric	0.01	0.00	0.00	0.00
Gas	0.00	0.00	0.04	0.04
<b>TOTAL across fuels:</b>	<b>0.01</b>	<b>0.00</b>	<b>0.04</b>	<b>0.04</b>
<b>RATIO: benefit/cost:</b>	1.7	1.1	1.6	2.1

### 3.6 SENSITIVITY ANALYSIS

The base case and standards levels as described above constitute a reference case against which the impacts of standards under different assumptions may be compared. The sensitivity analysis is performed by running the LBNL-REM for the base case and a combined standards case that includes standards level 3A for cooktops and oven. For each sensitivity case, the results for standards level 3A are compared to the corresponding base-case run and the differences are tabulated. The runs are based on the fuel price projections and housing forecasts from the AEO 1997.

The sensitivity cases selected are defined as follows:

1. *Lower Equipment Price.* The price of the baseline unit and the incremental price associated with each engineering level is decreased by the estimated uncertainty interval.
2. *Higher Equipment Price.* The price of the baseline unit and the incremental price associated with each engineering level is increased by the estimated uncertainty interval.
3. *High Equipment Efficiency.* The average efficiency is assumed to improve at a rate of 2% a year starting from year 2001 until the most efficient designs are achieved.

Supplemental Tables 3.31a through 3.31d show the unit energy consumption of cooktops and ovens for the three sensitivity cases. Supplemental Tables 3.22a to 3.22b show results for cumulative energy consumption. The sensitivity analysis of product shipments is given in Supplemental Tables 3.33a and 3.33b. Supplemental Tables 3.34a and 3.34b show the net present values of the reference and the sensitivity cases.

**Supplemental Table 3.31a Unit Energy Consumption of Electric Cooktops  
(weighted average kWh/yr)**

	Low Equipment Price		High Equipment Price		High Efficiency	
	Base	Level 3A	Base	Level 3A	Base	Level 3A
1981	235		235		235	
1993	226		235		235	
1996	226		235		235	
2001	226	226	235	235	230	230
2015	226	226	235	235	220	220
2030	226	226	235	235	220	220

**Supplemental Table 3.31b Unit Energy Consumption of Gas Cooktops  
(weighted average MMBtu/yr)**

	Low Equipment Price		High Equipment Price		High Efficiency	
	Base	Level 3A	Base	Level 3A	Base	Level 3A
1981	2.17		2.17		2.17	
1993	1.77		1.77		1.77	
1996	1.76		1.76		1.76	
2001	1.67	1.32	1.67	1.32	1.63	1.32
2015	1.52	1.32	1.52	1.32	1.26	1.26
2030	1.43	1.32	1.43	1.32	1.26	1.26

**Supplemental Table 3.31c Unit Energy Consumption of Electric Ovens  
(weighted average kWh/yr)**

	Low Equipment Price		High Equipment Price		High Efficiency	
	Base	Level 3A	Base	Level 3A	Base	Level 3A
1981	289		289		289	
1993	286		291		291	
1996	289		293		293	
2001	290	290	294	294	289	289
2015	294	294	297	297	224	224
2030	299	299	301	301	208	208

**Supplemental Table 3.31d Unit Energy Consumption of Gas Ovens  
(weighted average MMBtu/yr)**

	Low Equipment Price		High Equipment Price		High Efficiency	
	Base	Level 3A	Base	Level 3A	Base	Level 3A
1981	2.10		2.10		2.10	
1993	1.90		1.90		1.90	
1996	1.90		1.90		1.90	
2001	1.85	1.58	1.85	1.58	1.81	1.57
2015	1.74	1.60	1.74	1.60	1.36	1.36
2030	1.68	1.62	1.68	1.62	1.36	1.36

**Supplemental Table 3.32a Cumulative Energy Consumption of Cooktops  
During the Period 2001-2030 (Quadrillion Btu, Primary)**

	Base Case			Standard Level 3A			Saving		
	Electric	Gas	Total	Electric	Gas	Total	Electric	Gas	Total
Reference	5.87	2.65	8.53	5.89	2.38	8.27	-0.01	0.27	0.26
Low Equip. Price	5.70	2.65	8.36	5.71	2.38	8.10	-0.01	0.27	0.26
High Equip. Price	5.87	2.65	8.53	5.89	2.38	8.27	-0.01	0.27	0.26
High Efficiency	5.37	2.55	7.91	5.37	2.49	7.86	0.00	0.05	0.05

**Supplemental Table 3.32b Cumulative Energy Consumption of Ovens  
During the Period 2001-2030 (Quadrillion Btu, Primary)**

	Base Case			Standard Level 3A			Saving		
	Electric	Gas	Total	Electric	Gas	Total	Electric	Gas	Total
Reference	7.74	2.87	10.62	7.81	2.66	10.46	-0.06	0.22	0.16
Low Equip. Price	7.68	2.87	10.55	7.75	2.66	10.40	-0.07	0.22	0.15
High Equip. Price	7.74	2.87	10.62	7.81	2.66	10.46	-0.06	0.22	0.16
High Efficiency	6.94	2.50	9.44	6.96	2.45	9.41	-0.02	0.06	0.04

**Supplemental Table 3.33a Cumulative Shipments of Cooktops  
During the Period 2001-2030 (Millions)**

	Base Case			Standard Level 3A			Difference		
	Electric	Gas	Total	Electric	Gas	Total	Electric	Gas	Total
Reference	131.8	88.3	220.1	132.0	88.1	220.1	0.2	-0.2	0.0
Low Equip. Price	131.9	88.2	220.1	132.0	88.1	220.1	0.1	-0.1	0.0
High Equip. Price	131.9	88.2	200.1	132.1	88.0	220.1	0.2	-0.2	0.0
High Efficiency	123.1	97.0	220.1	123.1	97.0	220.1	0.0	0.0	0.0

**Supplemental Table 3.33b Cumulative Shipments of Ovens  
During the Period 2001-2030 (Millions)**

	Base Case			Standard Level 3A			Difference		
	Electric	Gas	Total	Electric	Gas	Total	Electric	Gas	Total
Reference	121.9	96.3	218.2	121.9	96.3	218.2	0.0	0.0	0.0
Low Equip. Price	121.9	96.3	218.2	121.9	96.3	218.2	0.0	0.0	0.0
High Equip. Price	121.9	96.3	218.2	121.9	96.3	218.2	0.0	0.0	0.0
High Efficiency	119.9	98.2	218.1	119.9	98.2	218.1	0.0	0.0	0.0

**Supplemental Table 3.34a Net Present Value to Consumers for Cooktops  
Sold During the Period 2001-2030  
(Discounted to 1990 at 7% Real in Billion 1990 dollar)**

Case	Standard Level 3A		
	Fuel Savings	Equipment Cost	NPV
Reference	0.08	0.06	0.02
Lower Equip. Price	0.08	0.06	0.02
Higher Equip. Price	0.08	0.06	0.02
High Efficiency	0.02	0.02	0.01

**Supplemental Table 3.34b Net Present Value to Consumers for Ovens  
Sold During the Period 2001-2030  
(Discounted to 1990 at 7% Real in Billion 1990 dollar)**

Case	Standard Level 3A		
	Fuel Savings	Equipment Cost	NPV
Reference	0.15	0.06	0.09
Lower Equip. Price	0.15	0.06	0.09
Higher Equip. Price	0.15	0.06	0.08
High Efficiency	0.05	0.02	0.03